

**To:** elliott.petri@westonsolutions.com[elliott.petri@westonsolutions.com]  
**From:** Way, Steven  
**Sent:** Thur 6/11/2015 9:09:30 PM  
**Subject:** FW: FW: Red and Bonita - Concrete Testing and Cylinder Size Variance

Elliott,

See Allen's comment on the testing and strength spec. I assume that information would be provided at the time of the testing request ??

Steven Way

Federal On-Scene Coordinator

Emergency Response Unit

US EPA - Region 8

1595 Wynkoop Street

Denver, CO 80202

Office: 303-312-6723

**From:** Sorrenson - DNR, Allen [mailto:allen.sorenson@state.co.us]  
**Sent:** Thursday, June 11, 2015 11:04 AM  
**To:** Way, Steven  
**Subject:** Re: FW: Red and Bonita - Concrete Testing and Cylinder Size Variance

Steve, the 4-inch diameter by 8-inch long test cylinders are suitable for the specified aggregate sizing. I'd note that the Construction Requirements and Specification details the minimum compressive strength for the concrete at the 7-day (3000 psi) and 28-day (3400 psi) breaks. Also, I'll be at the RnB at 8 am on June 25 to examine the adit with you, Matt, and Kurt Braun. -Allen

On Thu, Jun 11, 2015 at 9:11 AM, Way, Steven <[way.steven@epa.gov](mailto:way.steven@epa.gov)> wrote:

Allen,

Pending your review / concurrence, I will suggest to ER that we have the Subcontractor use this modified spec for the concrete cylinder testing. At this time, my plan is to have START perform a QA sample on the concrete testing in addition to the Sub's.

Thanks,

Steve

Steven Way

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**From:** Petri, Elliott [mailto:[Elliott.Petri@WestonSolutions.com](mailto:Elliott.Petri@WestonSolutions.com)]

**Sent:** Wednesday, June 10, 2015 2:14 PM

**To:** Way, Steven

**Cc:** Christner, Jan

**Subject:** Red and Bonita - Concrete Testing and Cylinder Size Variance

Hi Steve,

I found a firm based in Durango that has the capabilities and certification to do the testing (Trautner Geotech - <http://www.trautnergeotech.com/index.htm>). They use a smaller

cylinder at 4" dia. x 8" long and break one cylinder at the 7 day break, and 3 for each of the cure methods at the 28 day break and average the results. They also collect one additional cylinder to use if needed. For our testing that would be a total of 8 cylinders per sample.

I have requested a quote from Trautner, during , they have requested that the smaller cylinders be allowed for testing. For testing Trautner would send a tester to the site to conduct the field tests (slump, temperature, and air entrapment) and create the cylinders to be tested, we could make arrangements for them to return to pick up the cylinders or take them to their facility in Durango as needed.

The ASTM C31 states to use the 4x8 cylinders are that the maximum aggregate diameter is 1/3 the width of the cylinder, the specified mix design has a max aggregate size of No 57 (100% passes a 1.5 inch sieve and 95-100% passes a 1 inch sieve). At 1 inch that is 1/4 the total width of the cylinder so the 4x8 size should be acceptable.

Below is an outline of what the concrete requirements and the specified testing requirements from the Bulkhead design.

Concrete specs:

- 4000 psi
- V type – sulfate resistant cement
- Admixture – Xypex Admix 1000 or equivalent
- Coarse Aggregate – No. 57/67
- See attached mix design for remaining specifications

Testing Outline:

- One set of 3 cylinders (6" dia x 12" long each) per 5 CY of concrete – ***please request an allowance for use of the smaller cylinders (8 cylinders per set)***
- Approximately 27 CY concrete = 6 sets of cylinders

- Can pull samples from chute of trucks prior to piping up to/into the mine
- Comply with ASTM C31/C31M-98 – *Standard Practice for Making and Curing Concrete Test Specimens in the Field*
- Molded and Rodded (condensed) in the field in plastic molds
- Placed in heavy weight bags that are placed in the mine on a level surface near the bulkhead for curing.
- 7 Day test – remove two cylinders from each set and carefully taken to the lab for final curing
  - One will be tested at 7 days
  - One will be cured in lab conditions for 21 additional days
- 28 day test - the remaining cylinder from each set will be removed from the mine and taken to the lab for 28 day testing of in-situ conditions

Please let me know if you have any questions or need additional information regarding the smaller cylinder size for concrete strength testing.

Thanks,  
Elliott

**Elliott Petri, PE**

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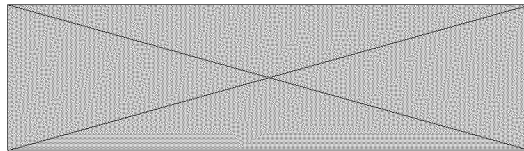
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**Allen C. Sorenson**

**Project Manager/Geological Engineer**

Inactive Mine Reclamation Program



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